Chapter I - Introduction: The Storm and First Response

Tropical Storm Agnes, opening the 1972 hurricane season, developed off Mexico's Yucatan Peninsula as a tropical depression on 15 June 1972. Three days later she was designated a hurricane. After striking land near Panama City, Fla., on the 19th, the storm lost hurricane force and was downgraded to a tropical depression. But Agnes sustained herself for days to come. Moving across Georgia and the Carolinas, she intensified again as she neared the Atlantic. Her passage along the New Jersey coast on 22 June was part of a typical tropical storm pattern. What followed was not.

The afternoon of 22 June 1972 Tropical Storm Agnes turned inland near New York City, headed westward through northern Pennsylvania and southern New York, and merged with a broad non-tropical low pressure system in central Pennsylvania. The results were disastrous.

Since first touching land, the storm was characterized by rain rather than wind. Heavy rainfall, not unusual in a storm of this type, occurred from Florida to New England. Yet Agnes stood apart from most of her predecessors because of the breadth of the area touched by her rains.[1] Rainfall totaled about 28.1 trillion gallons, nearly half of which fell in Pennsylvania and New York. Totals averaged eight to 12 inches throughout central Pennsylvania and exceeded 12 inches in several areas.

Greatly complicating the effects of Agnes' rainfall was the fact that rains earlier in June had already soaked the land from Virginia to New England. Now, small creeks and streams turned almost instantly into raging torrents. Larger rivers swelled tremendously. At Harrisburg on Wednesday morning the 21st of June, the Susquehanna was 4.82 feet high, only slightly above normal. The next day, the river rose from 11.29 feet at 7 a.m. to 24.1 feet by 9 p.m. Such rapid developments caught many by surprise: flood-warning systems did not function with full effectiveness.

As always, chance and unpredictability played a part. Had Agnes dumped her rains further east, for example, the effect in Wilkes-Barre would have been quite different. The city's rainfall, less than six inches, was actually small compared to many areas. But placement of heaviest amounts along the upper reaches of the Susquehanna and its tributaries hurt. The water eventually had to go by Wilkes-Barre.

The circumstances surrounding Agnes resulted in severe flooding nearly everywhere. Now the flood record books would also need revising. At Richmond, Va., where the previous record of 30 feet had stood since 1771, the James crested at 36.5 feet. On the main branch of the Susquehanna River in Pennsylvania crests were 12 to 18 feet above flood stage, surpassing levels of the 1936 flood of record.

At noon on 24 June the Susquehanna crested in Harrisburg just under 33 feet, almost four feet above the previous record. At that moment, 965,000 cubic feet of water per second rushed past the state capital. A record

650 billion gallons of water passed Harrisburg that day. New York's Chemung River, which flows through Corning and Elmira, created a lake four miles wide between the two cities.

The Chemung also overtopped flood protection levees in Corning and Elmira. The Susquehanna did likewise in Wilkes-Barre, where water exceeded protective walls in several places by five feet despite frantic sandbagging efforts. At Sunbury, Pa., where the main and west branches of the Susquehanna join, water lapped the top of the levees.

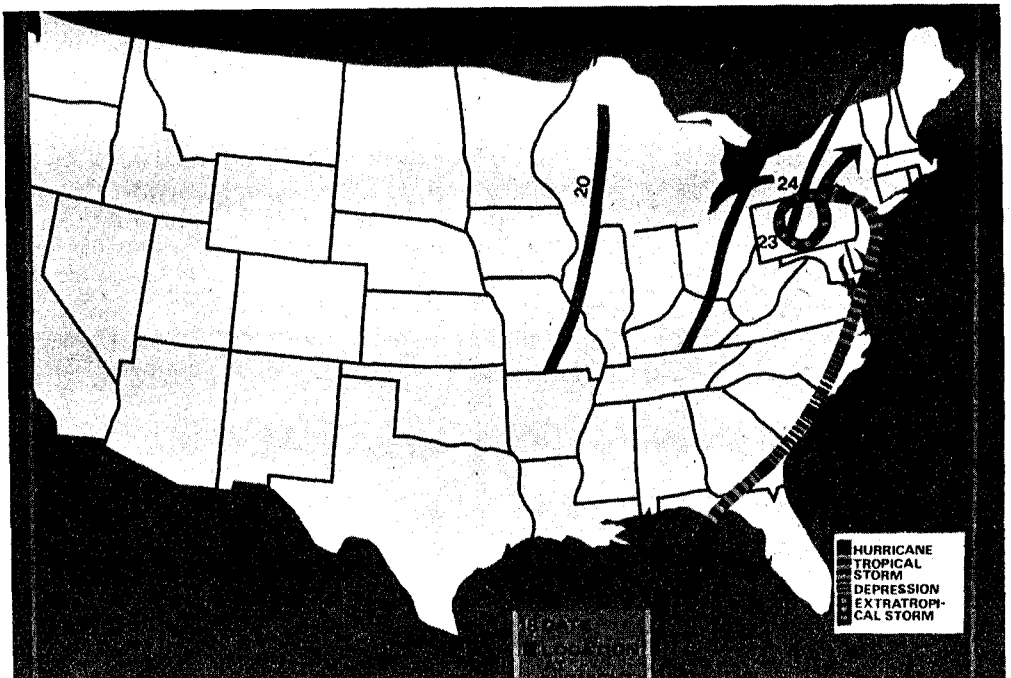
By surpassing the greatest anticipated volume for flood protection devices in so many cases, Agnes' floodwaters shattered planners' calculations. Their only consolation was that the walls at Sunbury held and that dams – including one under construction by the U.S. Army Corps of Engineers – prevented more than $488 million in damages in the Susquehanna basin, mostly along the western branch of the river.

By the time Tropical Storm Agnes left the continental United States, she was already being classified as the greatest natural disaster in United States history. Total losses ultimately exceeded $4 billion. Remarkably, fatalities related to the storm were comparatively low. Twenty deaths occurred in Maryland, 31 in New York, 48 in Pennsylvania, and 13 in Virginia. Total deaths were 122.

Damages, extensive all along the storm's path, were greatest in eastern Pennsylvania and southern New York. There the combination of heavy rains and flash floods was devastating, especially in the vicinity of Wilkes-Barre and Corning-Elmira. In Wilkes-Barre, a city of some 58,000 located on the east side of the Susquehanna in Pennsylvania's Wyoming Valley, about one-third of the city's homes were damaged by water that exceeded 20 feet in depth. More than 100,000 people fled their homes. All but 20 of 6000 homes in Kingston, a smaller city just across the river, suffered flood damage. The water in Kingston ranged in depth from 15 to 20 feet.[2] The flooding cut off power, telephone and sewer service in large areas of the Wyoming Valley. Roads were impassable and bridges were swept away. At Forty Fort, a borough a few miles northeast of Wilkes-Barre, the Susquehanna breached the levees, crashed into a 195-year-old burial ground, and disinterred an estimated 2000 bodies.

In the Corning-Elmira area, a similar situation prevailed. More than 80 percent of Elmira's phone service was cut off; and, in Corning, flooding interrupted natural gas service to 90 percent of the local users.

Damage to crops in Virginia exceeded $14 million. Pennsylvania's agriculturally rich York County was also hit hard. In the upper Chesa-

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Sandbaggers Flee Advancing Waters

peake Bay, crabs and oysters were severely affected by the storm-caused influx of debris, silt and fresh water. In Harrisburg, the Pennsylvania state capital, water covered most of the center city. The first floor of the governor's mansion was flooded. Inundation by mud- and debris-laden water, rather than the velocity of the water, accounted for most of the damages.

Agnes hit businesses throughout the Susquehanna River valley hard. More than 2700 of the Wyoming Valley's commercial establishments, most in downtown Wilkes-Barre, experienced some kind of flood damage. These were concerns which had accounted for 80 percent of business sales and receipts in 1967. Also sustaining damage in the downtown section of Wilkes-Barre were Kings and Wilkes Colleges, the city hall, post office and several schools. Losses in the Wyoming Valley were eventually calculated in excess of $1 billion, while, incredibly, only six lives were lost.

The Corning Glass Works and the Ingersoll-Rand Company, each employing about 6000 workers at the time of the flood, suffered damage in the millions. IBM and Xerox suffered heavy losses to leased equipment in customers' hands throughout the flood area. Manhattan Industries set damage at its Wilkes-Barre facilities at $5.5 million. Damages at Mrs. Smith's Pie Company in Pottstown, Pa., were $900,000. In Harrisburg, water flooded the plant of *The Patriot-News*, the city's major newspaper.

Not all businesses were so fortunate to carry flood insurance as was Corning Glass. Indeed, Manhattan Industries said their losses were largely uninsured. Some companies simply closed down, while others sought recovery through government loans. Widespread flood damage in New York was the final blow forcing the Erie-Lackawanna Railroad to declare bankruptcy. In Kingston, the Interstate Brands Corporation decided not to reopen a heavily damaged cake plant.

With business activity interrupted, unemployment rose. Bethlehem Steel plants in Pottstown and Steelton, Pa., each laid off 5000 workers. At the beginning of July, more than 50,000 people were reported to be out of work state-wide due to the storm.

In light of such devastating damage, Tropical Storm Agnes taxed local and state resources to the limit. On 23 June, recognizing that they could not act alone, the governors of Florida, Virginia, Maryland, Pennsylvania and New York asked President Nixon to declare their states major disaster areas. The President responded favorably that same day; declarations for West Virginia and Ohio followed in July. The Office of Emergency Preparedness (OEP), at the time charged with directing federal disaster response, then determined which counties and independent cities within those states were eligible for relief under Public Law 91-606, the Disaster Relief Act of 1970, enacted by Congress on 31 December 1970. OEP eventually found eligible all of Pennsylvania's 67 counties, 26 of New York's 62 counties, 72 of Virginia's 96 counties, the independent city of Baltimore, and 22 of Maryland's 23 counties.

Public Law 91-606 had consolidated existing federal disaster legislation and set new standards including a prohibition on discrimination in providing relief and establishment of minimum standards to be used in constructing new buildings. The law set down several ways whereby federal agencies might aid disaster victims. These included lending personnel, facilities, supplies and equipment to state and local governments, with or without compensation; performing emergency debris removal and repairs to damaged state and local government facilities; distributing food and medical supplies; and providing emergency shelter. The director of OEP, the man charged with coordinating federal relief, was specifically authorized to use federal agencies or make grants to individual states to remove debris and wreckage from both public and private lands and to provide temporary housing or emergency shelter to disaster victims. Under Public Law 91-606, federal spending was to give preference to local residents and businesses.

Normal OEP structure expanded to deal with the Agnes disaster. President Nixon appointed a federal coordinating officer for each state. It was his job to ascertain relief requirements and to work closely with state officials. Each federal coordinating officer established a disaster assistance field office consisting of representatives of federal, state and local

government agencies and of private relief organizations such as the American Red Cross. General George A. Lincoln, OEP director at the time of Agnes and a veteran of the U.S. Army Corps of Engineers, ordered emergency support teams put together on a temporary duty basis from federal departments and agencies to help the coordinating officers. The field offices coordinated all federal assistance to public entities and private individuals. OEP also established 93 individual assistance centers to inform victims of available help and how to apply for it. Nearly half were set up in Pennsylvania. The field office located in Harrisburg and a sub-field office in Wilkes-Barre. Money to carry out federal assistance programs came from the existing President's Disaster Relief Fund, from special funds of the Small Business and Farmers Home Administrations, and from supplemental appropriations passed by Congress after Agnes.[3]

Considering the magnitude of the disaster, federal response to Agnes mobilized quickly under the direction of OEP. Some far-reaching promises were made. On 23 June, for example OEP official Francis X. Carney pledged temporary housing for disaster victims in 90 days. Although OEP had direct control over all programs drawing upon the disaster fund, the agency handled the work by issuing legal documents in the form of mission assignments. These ordered other government agencies to complete tasks particularly suited to their ability.

One organization OEP relied upon heavily was the U.S. Army Corps of Engineers. The Corps had performed disaster relief before and, as will be demonstrated, stood ready to do so again. As Carney later stated:

> The Corps of Engineers is the best contracting agency in the U.S. Government. When we need contracting for debris removal, mini repair, such mission assignments go to the Corps.[4]

Even before OEP had begun to mobilize the federal effort under Public Law 91-606, the Corps of Engineers had moved into action. The Corps acted on the basis of the disaster provisions of its own Engineer Regulations, in accordance with Public Law 84-99, and in expectation of imminent mission assignments from OEP. Traditionally, Public Law 84-99, passed by Congress in the mid-1950's, served as the basis for any emergency measures taken by the Corps before major disaster areas had been designated. The law placed a fund directly under the auspices of the Chief of Engineers for tasks including flood emergency preparation, flood fighting and rescue operations, and repair of any flood control work threatened or destroyed by flood. Repairs made under this legislation were considered permanent in nature.

As far as the Corps of Engineers was concerned, Tropical Storm Agnes was unique in that the bulk of her destruction occurred within a single division of the Corps' organization – the North Atlantic Division (NAD) – where Major General Richard H. Groves was the division engineer. Damage was heaviest in the division's Baltimore District where Colonel Louis W. Prentiss, Jr., was district engineer. NAD was one of the largest divisions in the Corps in terms of contracted workload, and within the division, the Baltimore District had by far the heaviest workload. At the time Agnes struck, both division and district were deeply involved in normal civil and military construction jobs. Nevertheless, on 20 June General Groves ordered his district engineers "to mobilize and to contact all available contractors in anticipation of the expected flood fight and relief work."[5]

As Agnes approached, emergency operations control centers were activated at the Office of the Chief of Engineers in Washington, D.C.; at NAD headquarters in New York City; at the headquarters of other affected divisions; and at the offices of the districts involved. The Baltimore District's emergency operations control center began 24-hour operations on 21 June. Advance survey teams reached Harrisburg and Luzerne County, Pa., on 23 June. The New York Engineer District took over emergency relief work for the New York portion of the Susquehanna basin at the direction of the division engineer, while Colonel Prentiss

ordered the establishment of 14 disaster area offices within Baltimore District's civil works boundaries.

On Friday, 23 June, members of the newly established Wilkes-Barre Area Office arrived in the flood area. Led by Major Gerald A. Vick, assistant district engineer for civil works in Baltimore, the group set up headquarters in a hangar at the Naval Reserve Center in Avoca, Pa. There they joined Congressman Daniel J. Flood, U.S. Representative for Pennsylvania's 11th District, who was tirelessly overseeing early emergency rescue operations. After an aerial survey the following day, Chief of Engineers Frederick J. Clarke instructed that Corps military and civilian personnel be sent to the disaster area on temporary assignment.

Initially 68 officers were taken from the Engineer Officer Advanced School at Fort Belvoir, Va.; other personnel came from engineer districts ranging from Fort Worth, Texas to New England. A Wilkes-Barre newspaper declared:

> Wyoming Valley has become a melting pot of federal agency employees, military units and disaster services from across the country.[6]

Soon men and women with buttons proclaiming "The Corps Cares" were everywhere. Throughout the first phase of emergency operations, elements of the U.S. First Army, headquartered at Fort Meade, Md., and units of the Pennsylvania National Guard, the Army Reserves, and Navy Seabees augmented Corps personnel.

In a tremendous manpower mobilization effort, most personnel arrived at division, district and area offices within the Agnes disaster region between 25 and 28 June. Emergency offices established within the Baltimore District were manned almost entirely with borrowed people. "There was no way with my existing organization alone that I could have handled the emergency effectively," Prentiss recalled.[7]

A buildup of emergency work strength continued to parallel the expanding emergency effort. On 5 July, Corps personnel in the Wilkes-Barre area included 11 officers and 40

civilians. They were aided by 700 local workers and over 6000 military personnel. A week later, the Wilkes-Barre Area Office counted 84 civilian and military personnel.

The Office of Emergency Preparedness issued the first formal mission assignment to the Corps of Engineers on 26 June. Under its terms, the Corps was to perform "emergency work for the preservation of life and property to assure that individual emergency needs are met." The task would include cleaning up and removing debris, repairing and restoring public facilities, and providing technical and engineering advice to state and local agencies. In a move designed to further strengthen the Corps effort, General Clarke gave Groves responsibility for coordinating those Corps activities in New York and Pennsylvania that fell within the boundaries of other divisions. Also on 26 June, the North Atlantic Division engineer and his district engineers received authority to appoint contracting officers and let contracts. Philadelphia District had already awarded a contract on 24 June. Baltimore District's Wilkes-Barre Area Office had followed on the 26th.[8] While waters still inundated the area, the office in Wilkes-Barre was contacting government officials and publicly soliciting contractors. The Harrisburg Area Office divided its territory into sub-areas, placed an engineer officer from Fort Belvoir in charge of each, and had them meeting with local government officials and surveying damage in a matter of days. The aim, according to General Groves, was to be ready to go as soon as the waters receded.[9]

Demonstrating their desire to speed up the normal contracting process, Corps officials made contract awards remarkably fast in the weeks following. During the single week ending Wednesday, 5 July, for example, the Corps awarded 140 contracts valued at $3.5 million for the Luzerne County effort alone. The Baltimore District's Lock Haven Area Office, whose territory encompassed the Susquehanna's west branch, where damages exceeded $350 million, had 12 debris removal contracts underway by 5 July. Award of a dozen more was projected a few days later. Even as new contracts were being let, others neared completion. Cleanup operations in Steelton, southeast of Harrisburg, were finished about 3 July. And a cofferdam, being erected at Forty Fort, Pa., to ease dike repairs, was 90 percent completed by 5 July.[10]

Debris removal consumed most of the Corps' energy in the initial emergency phase of the Agnes recovery, lasting about a month. In the Wilkes-Barre area alone, the Corps removed more than eight million cubic yards of debris. Lines of trucks, mostly civilian, contracted by the Corps, and some belonging to the Army, hauled the trash to a series of landfills established in the area. In Harrisburg, the Corps calculated daily debris removal expenditures at $60,000.[11]

Some special problems were encountered in the rescue operation. Traffic was one. When city officials restricted access to Wilkes-Barre and declared martial law, the Corps helped by hiring two bus firms to provide residents with free transportation.[12]

Another problem was water trapped in low spots on the land side of levees. "We pumped from impounded areas to existing storm drains, pumped from impounded areas to the river and tributaries, and ditched to allow proper runoff," recalled Captain Donald F. McCullough of the Wilkes-Barre Area Office. "When we exhausted the local supply of pumps, we went as far away as necessary to get the needed equipment."[13]

Other formal mission assignments given to the Corps by OEP during the first weeks of the relief effort included making damage surveys to determine eligibility under Public Law 91-606, assisting in the project application program, obtaining and installing Bailey bridges, and making temporary repairs to housing units. The project application assignment, not a traditional one for the Corps, included providing technical and administrative assistance, performing inspections and audits, and making reimbursements for eligible work on applications of $50,000 or less. Between 4 and 8 July, the Corps began construction of seven temporary Bailey bridges. Two of them were completed during the same time period.

The temporary housing repair program known as mini-repair actually started after formation of the Susquehanna Engineer

District, and accordingly will be discussed below. On 5 July, the North Atlantic Division engineer entered into an agreement with the Commonwealth of Pennsylvania for the development of mobile home group sites. The hope was to move residents of the disaster area from emergency shelters, where the effects of close quarters were beginning to tell, and place them in more suitable quarters. Work on two sites in Luzerne County began that same day; others followed a short time later.

In July it became increasingly clear that the scope of work involved in cleaning up and recovering from Agnes would be tremendous. Damage estimates were being revised upward almost daily. Two weeks after the flood thousands were still homeless in the Wilkes-Barre area while other thousands stayed on in damaged dwellings trying to clean up. The tiny village of Shickshinny, a few miles downstream from Wilkes-Barre, remained in virtual isolation.

Government agencies were plagued by staff shortages in light of the heavy demand for services. Individual frustrations mounted. Though the relief agencies could point with pride to emergency recovery accomplishments, much remained to be done. It was in this atmosphere that officials of the U.S. Army Corps of Engineers began to think of new ways to continue fulfilling their mission effectively.